

REMARKS AND DISCUSSION

Upon entry of the present Amendment-C, the application includes claims 1 and 3-12, of which claims 1, 5, 6, 8 and 11 are independent. Claims 1, 5, 6, 8 and 11 have been amended by the present amendment.

Response to Office Action

The above-identified Office Action has been reviewed, the references carefully considered, and the Examiner's comments carefully weighed. In view thereof, the present Amendment-C is submitted.

It is contended that by the present Amendment-C and response, all bases of rejections set forth in the Office Action have been traversed and/or overcome. Accordingly, reconsideration and withdrawal of the rejections is respectfully requested.

Amendments

In the interest of expediting prosecution of the application, applicant has amended claims 1, 5, 6, 8 and 11 by the present amendment.

In the Claims: Claim 1 has been amended by defining that the cavity forming member is a separate body that is fitted onto and made integral with the surface of said main body.

Each of claims 5 and 6 have been amended by defining that the cavity forming member is fused to the main body on a face of the mold cavity through welding.

Each of claims 8 and 11 has been rewritten in independent form by including limitations of base claims 5 and 6, respectively.

Applicant respectfully submits that the above amendments are fully supported by the

original disclosure, including the specification, claims and drawings. Applicant also respectfully submits that no new matter is introduced into the application by the above amendments because all of the subject matter thereof was expressly or inherently disclosed in the original specification.

Claim Rejections – 35 USC §103(a)

1. In the Office Action (page 2, item 3), the Examiner rejected claims 1 and 3-4 under 35 USC §103(a) as being unpatentable over either Komatsu (US 3,848, 847) or Horvath (US 2,495,064) in view of Kumpula (US 6,561,258).

It is the Examiner's position that Komatsu et al. (Col. 1, lines 56+) substantially teach the claimed die and the method of manufacturing the casting die, comprising the use of a gate 5 and a die main body (core pin 4) of an anneal alloy tool steel (SKD 61) having a wall surface for defining a bend or curved mold cavity and a cavity forming member or an insert (a metal carbide layer) disposed or embedded on the main body. Further, the Examiner asserts that Horvath (Col. 3, lines 1+) substantially teach the claimed die and the method of manufacturing the casting die, comprising the use of a gate 14 and die main body (steel mounting blocks 16, 17) of air hardened or high speed steel, or equivalent to steel (SKD 61) having a wall surface for defining a mold cavity and a cavity forming member or an insert (carbide inserts 19, 20) disposed or embedded on the main body.

Although, the Examiner concedes that both Komatsu and Horvath fail to teach the use of better steel for the insert, the Examiner cites Kumpula (Col. 2, lines 62+) as providing a teaching of the use of better steel such as maraging steel served as material of mold or die parts (inserts) for the purpose of effectively improving the thermal stability and mechanical properties of the die parts; and the Examiner considers that it would have been obvious to one having ordinary

skill in the art at the time of the invention to provide either Komatsu or Horvath the use of better steel for the insert as taught by Kumpula in order to effectively reduce the hot corrosion and stress impact due to the casting molten aluminum.

Applicant's Response:

Upon careful consideration and in light of the above amendments, applicant respectfully traverses such rejection, and submits that each of claims 1 and 3-4 is patentably distinct over the disclosures of Komatsu, Horvath and Kumpula because none of these references discloses features of independent claim 1, such that any hypothetical combination of these references based on the actual teachings thereof will fail to achieve or make obvious the claimed invention.

With regards to Komatsu, applicant respectfully disagrees with the Examiner's assertion that Komatsu substantially teaches the claimed die. In the rejection, the Examiner interprets the core pin 4 of Komatsu as corresponding to the claimed die main body, and interprets the metal carbide layer formed on the core pin 4 through a diffusion method of carburization as corresponding to the claimed cavity forming member. However, applicant notes that the main body (pin 4) of Komatsu is *completely encased by the cavity forming member*, since as presented in Example 1 (col. 3, lines 55+), the core pin is "immersed in a bath of fused borax..." whereby the entire outer surface of this part is chemically altered. As a result, the cavity forming member of Komatsu provides *the entire outer surface of the part*, such that the main body (pin 4 except at outer surface) does not have a wall surface defining a mold cavity, as claimed.

Applicant notes that the diffusion method involving carburization as disclosed by Komatsu for use on at least portions of the mold surface which are subjected to corrosion, erosion, or wear is quite different from the present invention, and claimed by the applicant. As

disclosed in the present specification, the surface treatments like the one disclosed by Komatsu (Para. 6-7) are disadvantageous. In particular, portions of casting dies which are subject to intensive heat shocks are susceptible to heat cracks despite use of the heat treatments like those described by Komatsu, and cost benefits of this technique are minimal. Quite differently, the present invention includes an insert member within the die at the location which experiences the greatest thermal shock, for example, at a location immediately adjacent to the gate, and wherein the insert member is formed by material deposition on the surface of the mold or by fitting a separate member onto the surface of the mold.

Further, regarding the Examiner's rejection of claim 4, the applicant respectfully disagrees that Komatsu provides a teaching of placement of the cavity forming member "in a position closest to said gate" as claimed, since the core pin 4 is clearly disposed at a location which is spaced apart from the gate 5. Moreover, the applicant respectfully notes that as seen in Fig. 1, the left-side ejection pin 3 appears to be closer to the gate than the core pin 4, whereby Komatsu does not disclose the core pin 4 as being in a position closest to said gate.

Regarding the disclosure of Horvath, applicant respectfully disagrees that Horvath discloses a casting die comprising a cavity forming member that is integral with the main body, such as claimed. Rather, Horvath discloses small carbide inserts 19 and 20 soldered to mounting blocks 16 and 17. The mounting blocks 16 and 17 are steel blocks that are bolted into recesses formed in the mold bodies 10, 11, so as to be removable therefrom.

Thus, Horvath discloses that the inserts 19 and 20 are integral with the mounting blocks 16, 17, rather than the mold bodies. Applicant particularly notes that Horvath actually *teaches away from the claimed invention*, stating that attempts to solder wear resistant carbides directly to the walls of the mold resulted in a tempering of the previously-hardened mold walls, such that

the hardness of the mold was *considerably impaired*. Thus, Horvath teaches soldering the carbide inserts to a separate body (mounting block 16, 17), and then attaching the separate body to the mold wall, whereby the hardness of the mold wall is preserved.

Applicant notes that the U.S. Court of Appeals for the Federal Circuit has established that a prima facie case of obviousness can be rebutted if the applicant . . . can show 'that the art in any material respect taught away' from the claimed invention." *In re Geisler*, 116 F.3d 1465, 1469, 43 USPQ2d 1362, 1365 (CAFC 1997). "A reference may be said to teach away when a person of ordinary skill, upon reading the reference, . . . would be led in a direction divergent from the path that was taken by the applicant." *Tec Air, Inc. v. Denso Mfg. Mich. Inc.*, 192 F.3d 1353, 1360, 52 USPQ2d 1294, 1298 (CAFC 1999), *In re Haruna*, 249 F.3d 1327; 58 U.S.P.Q.2D 1517 (CAFC 2001). Since Horvath teaches away from applicant's claimed invention, instead of rendering applicant's claims obvious, Horvath *provides evidence of non-obviousness* of applicant's invention.

Regarding the disclosure of Kumpula, applicant references the argument and analysis provided for in the applicant's earlier submitted Amendment-B filed December 29, 2006 (pp. 7-10). In particular, applicant notes that Kumpula discloses a precipitate-hardened maraging steel having high strength, good ductility, small thermal expansion coefficient, good thermal conductivity and significantly better thermal stability than other maraging steels. The preferred field use for the inventive steel is as a mold material for pressure casting of light metal alloys. Thus, Kumpula discloses a steel having properties which are suited for use in forming a mold, *but does not consider or suggest forming a composite mold of one or more materials*.

Furthermore, applicant respectfully disagrees that it would be obvious to modify Komatsu to include the use of a better steel for the insert as taught by Kumpula, since neither Komatsu nor Kumpula suggest or disclose use of an insert, such that there is no impetus or teaching or motivation

of forming the insert of a material which is different than that of the die main body. Komatsu discloses forming the cavity forming member of the same material as the die body, since the exterior surface of the core pin is provided as the same material as the interior portions, and subsequent to formation, the exterior surface is provided with a carburizing treatment. Kumpula discloses a steel having properties which are suited for use in forming a mold, but does not consider or suggest forming a composite mold of more than one material.

Thus, the applicant respectfully points out that any modification of Komatsu by the actual teachings of Kumpula would (at most) result merely in an invention in which both the die main body (core pin 4) and the cavity forming member (exterior surface of core pin 4) of Komatsu are formed of the improved maraging steel of Kumpula. Such a modification does not meet, or make obvious, the claimed invention in which the cavity forming member is *made of a material which is better than the steel used to form the main body*.

In this regard, the applicant respectfully notes that the above distinction is significant in that the die according to the invention can be produced more efficiently / inexpensively, thus reducing the cost of parts subsequently formed using the die, as discussed in the application.

Although applicant disagrees with the rejection of claims 1, 3, 4 as discussed above, in an effort to expedite prosecution of the application, applicant has amended claim 1 by further defining *that the cavity forming member is a separate body that is fitted into and made integral with the surface of the main body*. This added limitation further emphasizes the above distinctions between the claimed invention and the applied references.

For all the foregoing reasons, applicant respectfully requests reconsideration and withdrawal of rejection of claims 1 and 3-4 under 35 USC §103(a).

2. In the Office Action (page 3, item 4), the Examiner rejected claims 5-12 under 35 USC §103(a) as being unpatentable over either Komatsu or Horvath in view of Kumpula and further in view of White (US 6,306,467). Although the Examiner concedes that both Komatsu and Horvath, as modified by Kumpula, fail to teach the use of welding in depositing the maraging steel as the insert, the Examiner has taken the position that White (Col. 2, lines 15+) teaches that the maraging steels can be sprayed or formed into tool parts by arc-welding for the purpose of effectively producing tool parts without using machining method, wherein the maraging steels are well been hardened and difficult to be machined. The Examiner considers that it would have been obvious to one having ordinary skill in the art at the time of the invention to provide either Komatsu or Horvath in view of Kumpula the use of welding method as taught by White "... in order to effectively to form insert on the mold surface the die main body."

Applicant's Response:

Upon careful consideration and in light of the above amendments, applicant respectfully traverses such rejection, and submits that each of claims 5-12 is patentably distinct over the applied references for reasons provided in relation to claims 1, 3, 4, hereinabove, which are not overcome by any additional teachings of White, and for several reasons including those given below.

For example, White discloses a method of fabricating solid free form of objects wherein the primary object of the method is to produce solid free form sprayed object with a smooth and dimensionally controlled surface, to produce better deposits of molten droplets when spraying from a free-formed object and to eliminate secondary finishing operations (Col. 1, lines 33-39). Moreover, White discloses a method wherein forming molten droplets and spraying the molten

droplets upward against a substrate 12 to form a net shaped object 10 (Abstract).

Thus, although White discloses an arc-welding torch 20, and metal welding wire 22 as a metal spraying device, White is directed to formation of free form objects, including tools, such that the disclosure of White is *not related to formation of casting dies (generally) nor to the particular problem addressed by the present invention (e.g., a casting die that must be replaced less frequently).*

Applicant respectfully submits that according to the MPEP 2141.01(a), the Examiner must determine what is "analogous prior art" for the purpose of analyzing the obviousness of the subject matter at issue. "In order to rely on a reference as a basis for rejection of an applicant's invention, the reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned." *In re Oetiker*, 977 F.2d 1443, 1446, 24 USPQ2d 1443, 1445 (Fed. Cir. 1992).

Because the subject matter of White is non-analogous under the relevant standards, applicant respectfully disagrees that one of ordinary skill in the art would (in the first place) refer to the White reference even if they were considering the possibility of modifying Komatsu or Horvath, as modified by Kumpula.

Moreover, the applicant respectfully disagrees with the Examiner's assertion that White provides a teaching of a welding method of depositing a maraging steel *as an insert*. The applicant notes that White does not disclose a "welding" of materials in accordance with the conventionally understood meaning of the term "welding". For example, the *McGraw-Hill Dictionary of Scientific and Technical Terms*, ©1974, p. 1607, defines "welding" as "joining two materials by applying heat to melt and fuse them, with or without filler material." Such a technique is not disclosed by White. Rather, applicant respectfully points out that White

discloses that an object/tool 10 is formed by spraying molten material onto a substrate 12, which may be flat (14 in Figs. 1-4) or shaped (18 in Fig. 6), whereby one side of the object/tool 10 obtains its final shape (col. 2, lines 15-25), and after the completed object/tool 10 is built, the substrate 12 is *removed* (col. 3, lines 21-22).

Thus, White does not provide a teaching of a welding method of depositing a maraging steel as an insert, whereby the object 10 is fused to the substrate 12, but instead merely discloses a method of forming an object of a desired shape as determined by the shape of the substrate 12, *since in use the substrate does not function together with the object/tool 10*.

Again, although applicant disagrees with the rejection of claims 5-12 as discussed above, in an effort to expedite prosecution of the application claims 5, 6 are amended above to further define that the cavity forming member is fused to the main body on a face of the mold cavity through welding. This added limitation further emphasizes the above distinctions between the claimed invention and the applied references.

For all the foregoing reasons, applicant respectfully requests reconsideration and withdrawal of the rejection of claims 5-12 under 35 USC §103(a).

Conclusion

Applicant respectfully submits that all of the above amendments are fully supported by the original application. Applicant also respectfully submits that the above amendments do not introduce any new matter into the application, as all of the subject matter thereof was expressly or inherently disclosed in the original specification, including the drawings.

Based on all of the foregoing, applicant respectfully submits that all of the objections and rejections set forth in the Office Action are overcome, and that as presently amended, all of the

pending claims are believed to be allowable over all of the references of record, whether considered singly or in combination. Applicant requests reconsideration and withdrawal of the rejections of record, and allowance of all pending claims. Applicant respectfully submits that the application is now in condition for allowance, and a Notice to this effect is earnestly solicited.

If the Examiner is not fully convinced of all of the allowability of all of the claims now in the application, applicant respectfully requests that the Examiner telephonically contact applicant's undersigned representative to expeditiously resolve any issues remaining in the prosecution of the application.

A fee for two independent claims in excess of three is being concurrently paid online via EFS-Web.

Favorable reconsideration is respectfully requested.

Respectfully submitted,



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